

Application No. 10/736,866
Amendment dated June 9, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) An interbody spinal implant for insertion at least in part across the surgically corrected height of a disc space between adjacent vertebral bodies of a human spine, the vertebral bodies each having an anterior aspect, a posterior aspect, and an endplate having an apophyseal rim proximate the perimeter of the endplate, said implant comprising:

a leading end for insertion first into the disc space, a trailing end opposite said leading end, and therebetween a length along a mid-longitudinal axis of said implant, said leading end being asymmetrical;

opposed portions between said leading and trailing ends adapted to be placed within the disc space to contact and support the adjacent vertebral bodies, said opposed portions being non-arcuate along at least a portion of the length of said implant, each of said opposed portions having at least one opening therein to permit for the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant, said implant being formed of bone;

an interior facing side wall, an exterior facing side wall opposite said interior side wall, and a width therebetween, said width of said implant being less than approximately one-half of the maximum width of the adjacent vertebral bodies into which said implant is adapted to be inserted, said interior and exterior side walls being between said opposed portions and said leading and trailing ends, said interior side wall adapted to be oriented toward another implant when inserted within the disc space, each of said opposed portions having a vertebral body contacting surface between said at least one opening and at least one of said interior side wall and said exterior side wall, each of said vertebral body contacting surfaces being adapted to be placed toward one of the adjacent

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vertebral bodies, said opposed portions being spaced apart to define a hollow interior therebetween in communication with said openings; and

said implant having a minimum length as measured from said leading end to said trailing end so that said leading end and said trailing end of said implant are adapted to rest upon portions of the apophyseal rim when implanted, said implant being adapted to be wholly contained within the disc space when implanted.

2. (original) The implant of claim 1, wherein said leading and trailing ends each have a radius of curvature, the radius of curvature of said leading end being different from the radius of curvature of said trailing end.
3. (original) The implant of claim 2, wherein the radius of curvature of said leading end is greater than the radius of curvature of said trailing end.
4. (original) The implant of claim 1, wherein said leading end includes a curve that extends from said exterior facing side wall beyond the mid-longitudinal axis of said implant.
5. (original) The implant of claim 1, further comprising at least one protrusion extending from at least one of said opposed portions for engaging at least one of the adjacent vertebral bodies to maintain said implant within the disc space.
6. (original) The implant of claim 5, wherein said protrusion comprises a ridge.
7. (original) The implant of claim 1, further comprising a plurality of surface roughenings for engaging the adjacent vertebral bodies and for maintaining said implant in place, said surface roughenings being present on at least a part of said opposed portions.
8. (original) The implant of claim 1, in combination with a fusion promoting substance.
9. (original) The implant of claim 8, wherein said fusion promoting substance is at least one of bone, morphogenetic protein, and genes coding for the production of bone.

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10. (original) The Implant of claim 1, wherein at least a portion of said opposed portions are in a diverging relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.
11. (original) The implant of claim 1, wherein at least a portion of said opposed portions are generally in a converging relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.
12. (original) The implant of claim 1, wherein at least a portion of said leading end is tapered from opposed portion to opposed portion for facilitating insertion of the implant between the two adjacent vertebral bodies.
13. (original) The implant of claim 1, wherein said opposed portions have a porous surface.
14. (original) The implant of claim 1, wherein said opposed portions have a bone ingrowth surface.
15. (original) The implant of claim 1, wherein said implant is treated with a fusion promoting substance.
16. (original) The implant of claim 15, wherein said fusion promoting substance is bone morphogenetic protein.
17. (original) The implant of claim 1, wherein said opposed portions have at least two openings therein.
18. (original) The implant of claim 1, further comprising a plurality of openings and passages for retaining fusion promoting substance.
19. (original) The implant of claim 1, wherein said implant is adapted for insertion from the posterior aspect of the vertebral bodies and said leading end is configured to conform to the anatomic contour of at least a portion of the anterior aspect of the vertebral bodies.
20. (original) The implant of claim 1, wherein said implant is adapted for insertion from the anterior aspect of the vertebral bodies and said leading end is

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configured to conform to the anatomic contour of at least a portion of the posterior aspect of the vertebral bodies.

21. (original) The implant of claim 1, wherein said implant is adapted for insertion from a first lateral aspect of the vertebral bodies and said leading end is configured to conform to the anatomic contour of at least a portion of a second lateral aspect of the vertebral bodies opposite the first lateral aspect.
22. (original) The implant of claim 1, wherein said trailing end is generally symmetrical relative to the mid-longitudinal axis.
23. (original) The implant of claim 1, wherein less than half of said leading end is along a line perpendicular to the mid-longitudinal axis of said implant in a plane dividing said implant into an upper half and a lower half.
24. (original) The implant of claim 1, wherein said bone is selected from the group including cortical fibers, bone filaments, and bone particles.
25. (original) The implant of claim 1, in combination with a fusion promoting material other than bone.
26. (original) The implant of claim 1, wherein said implant comprises a bone ingrowth material other than bone.
27. (original) The implant of claim 1, further comprising a material, other than the bone from which said implant is formed, that intrinsically participates in the growth of bone from one of the adjacent vertebral bodies to the other of the adjacent vertebral bodies.
28. (original) The implant of claim 1, in combination with an osteogenic material other than bone.
29. (original) The implant of claim 28, wherein said osteogenic material is at least one of bone morphogenetic protein and genes coding for the production of bone.
30. (original) The implant of claim 1, in combination with a driver instrument for installing said implant into the spine.
31. (new) An interbody spinal implant for insertion at least in part across the surgically corrected height of a disc space between adjacent vertebral bodies of

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a human spine, the vertebral bodies each having an anterior aspect and a posterior aspect, said implant comprising:

a leading end for insertion first into the disc space, a trailing end opposite said leading end, and therebetween a length along a mid-longitudinal axis of said implant, said leading end being asymmetrical;

opposed portions between said leading and trailing ends adapted to be placed within the disc space to contact and support the adjacent vertebral bodies, said opposed portions being non-arcuate along at least a portion of the length of said implant, each of said opposed portions having at least one opening therein to permit for the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant, said implant being formed of bone;

an interior facing side wall, an exterior facing side wall opposite said interior side wall, and a width therebetween, said width of said implant being less than approximately one-half of the maximum width of the adjacent vertebral bodies into which said implant is adapted to be inserted, said leading end having a curved portion extending from one of said side walls across more than one-half of the width of said implant, said interior and exterior side walls being between said opposed portions and said leading and trailing ends, said interior side wall adapted to be oriented toward another implant when inserted within the disc space, each of said opposed portions having a vertebral body contacting surface between said at least one opening and at least one of said interior side wall and said exterior side wall, each of said vertebral body contacting surfaces being adapted to be placed toward one of the adjacent vertebral bodies, said opposed portions being spaced apart to define a hollow interior in communication with said openings; and

said implant being adapted to be wholly contained within the disc space when implanted.

32. (new) The implant of claim 31, wherein said leading and trailing ends each have a radius of curvature, the radius of curvature of said leading end being different

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- from the radius of curvature of said trailing end.
33. (new) The implant of claim 32, wherein the radius of curvature of said leading end is greater than the radius of curvature of said trailing end.
34. (new) The implant of claim 31, further comprising at least one protrusion extending from at least one of said opposed portions for engaging at least one of the adjacent vertebral bodies to maintain said implant within the disc space.
35. (new) The implant of claim 31, further comprising a plurality of surface roughenings for engaging the adjacent vertebral bodies and for maintaining said implant in place, said surface roughenings being present on at least a part of said opposed portions.
36. (new) The implant of claim 31, in combination with a fusion promoting substance.
37. (new) The implant of claim 36, wherein said fusion promoting substance is at least one of bone, morphogenetic protein, and genes coding for the production of bone.
38. (new) The implant of claim 31, wherein at least a portion of said opposed portions are in a diverging relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.
39. (new) The implant of claim 31, wherein at least a portion of said opposed portions are generally in a converging relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.
40. (new) The implant of claim 31, wherein said implant is adapted for insertion from the posterior aspect of the vertebral bodies and said leading end is configured to conform to the anatomic contour of at least a portion of the anterior aspect of the vertebral bodies.
41. (new) The implant of claim 31, wherein said implant is adapted for insertion from the anterior aspect of the vertebral bodies and said leading end is configured to

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conform to the anatomic contour of at least a portion of the posterior aspect of the vertebral bodies.

42. (new) The implant of claim 31, wherein said implant is adapted for insertion from a first lateral aspect of the vertebral bodies and said leading end is configured to conform to the anatomic contour of at least a portion of a second lateral aspect of the vertebral bodies opposite the first lateral aspect.
43. (new) The implant of claim 31, wherein said trailing end is generally symmetrical relative to the mid-longitudinal axis.
44. (new) An interbody spinal implant for insertion at least in part across the surgically corrected height of a disc space between adjacent vertebral bodies of a human spine, the vertebral bodies each having an anterior aspect, a posterior aspect, and an endplate having an apophyseal rim proximate the perimeter of the endplate, said implant comprising:

a leading end for insertion first into the disc space, a trailing end opposite said leading end, and therebetween a length along a mid-longitudinal axis of said implant, said leading end being asymmetrical, at least one of said ends having a curved portion that is configured to conform to the anatomic contour of at least a portion of one of the anterior and posterior aspects of the vertebral bodies;

opposed portions between said leading and trailing ends adapted to be placed within the disc space to contact and support the adjacent vertebral bodies, said opposed portions being non-arcuate along at least a portion of the length of said implant, each of said opposed portions having at least one opening therein to permit for the growth of bone from adjacent vertebral body to adjacent vertebral body through said implant, said implant being formed of bone;

an interior facing side wall, an exterior facing side wall opposite said interior side wall, and a width therebetween, said width of said implant being less than approximately one-half of the maximum width of the adjacent vertebral bodies into which said implant is adapted to be inserted, said interior and exterior side walls being between said opposed portions and said leading and trailing

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ends, said interior side wall adapted to be oriented toward another implant when inserted within the disc space, each of said opposed portions having a vertebral body contacting surface between said at least one opening and at least one of said interior side wall and said exterior side wall, each of said vertebral body contacting surfaces being adapted to be placed toward one of the adjacent vertebral bodies, said opposed portions being spaced apart to define a hollow interior therebetween in communication with said openings; and

said implant having a minimum length as measured from said leading end to said trailing end so that a majority of at least one of said leading end and said trailing end of said implant are adapted to rest upon portions of the apophyseal rim when implanted, said implant being adapted to be wholly contained within the disc space when implanted.

45. (new) The implant of claim 44, wherein said leading and trailing ends each have a radius of curvature, the radius of curvature of said leading end being different from the radius of curvature of said trailing end.
46. (new) The implant of claim 45, wherein the radius of curvature of said leading end is greater than the radius of curvature of said trailing end.
47. (new) The implant of claim 44, further comprising at least one protrusion extending from at least one of said opposed portions for engaging at least one of the adjacent vertebral bodies to maintain said implant within the disc space.
48. (new) The implant of claim 44, further comprising a plurality of surface roughenings for engaging the adjacent vertebral bodies and for maintaining said implant in place, said surface roughenings being present on at least a part of said opposed portions.
49. (new) The implant of claim 44, in combination with a fusion promoting substance.
50. (new) The implant of claim 49, wherein said fusion promoting substance is at least one of bone, morphogenetic protein, and genes coding for the production of bone.

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51. (new) The implant of claim 44, wherein at least a portion of said opposed portions are in a diverging relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.
52. (new) The implant of claim 44, wherein at least a portion of said opposed portions are generally in a converging relationship to each other from trailing end to leading end for allowing angulation of the adjacent vertebral bodies relative to each other.
53. (new) The implant of claim 44, wherein said implant is adapted for insertion from the posterior aspect of the vertebral bodies and said leading end is configured to conform to the anatomic contour of at least a portion of the anterior aspect of the vertebral bodies.
54. (new) The implant of claim 44, wherein said implant is adapted for insertion from the anterior aspect of the vertebral bodies and said leading end is configured to conform to the anatomic contour of at least a portion of the posterior aspect of the vertebral bodies.
55. (new) The implant of claim 44, wherein said implant is adapted for insertion from a first lateral aspect of the vertebral bodies and said leading end is configured to conform to the anatomic contour of at least a portion of a second lateral aspect of the vertebral bodies opposite the first lateral aspect.
56. (new) The implant of claim 44, wherein said trailing end is generally symmetrical relative to the mid-longitudinal axis.